UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/613,188	07/03/2003	Christoper A. Edwards	TI-35509	4949

23494 7590 02/08/2008
TEXAS INSTRUMENTS INCORPORATED
P O BOX 655474, M/S 3999
DALLAS, TX 75265

EXAMINER	
TRAN, CON P	

ART UNIT	PAPER NUMBER
2615	

NOTIFICATION DATE	DELIVERY MODE
02/08/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com
uspto@dlemail.itg.ti.com

Office Action Summary	Application No.	Applicant(s)	
	10/613,188	EDWARDS, CHRISTOPER A.	
	Examiner	Art Unit	
	Con P. Tran	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *03 July 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-36* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 1, 23, 27, 35, and 36 are objected to because of the following informalities:

Claim 1, each of lines 1 and 2 states "a digital audio signal". It is unclear whether "a digital audio signal" in line 2 is the same "a digital audio signal" in line 1. For purpose of examination, examiner interprets "a digital audio signal" in line 2 as "the digital audio signal";

Claim 1 recites "the frequency spectrum" in lines 3-4. There is insufficient antecedent basis for this limitation in the claim. For purpose of examination, examiner interprets this limitation as "the defined frequency spectrum";

Claim 1 recites "the signal harmonics" in line 7. It is unclear which harmonics of "a number of signal harmonics" being "the signal harmonics". For purpose of examination, examiner interprets this limitation as "the number of signal harmonics".

Claim 23 recites "the digital input digital audio signal" in line 4. There is insufficient antecedent basis for this limitation in the claim. For purpose of examination, examiner interprets this limitation as "the defined frequency spectrum";

Claim 23, each of lines 2, 6, 9, and 13 states "adapted to", which is deemed not a positive limitation.

Claim 27, line 2 states "adapted to", which is deemed not a positive limitation.

limitation.

Claim 36, each of lines 4, 8, 11, 14, and 16 states "adapted to", which is deemed not a positive limitation.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. **Claims 1-9 and 16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Case U.S. Patent 6,335,973 in view of Stilson U.S. Patent 5,740,716 and further in view of Machanian et al. U.S. Patent 3,935,783 (hereinafter, "Machanian").

Regarding **claim 1**, Case teaches a method of processing a digital audio signal (see Figs. 1, 2, 12, 13; digital application, col. 3, lines 20-33), comprising the steps of:

providing the digital audio signal having a defined frequency spectrum (amplitude vs frequency plots, see Figs. 1, 2, 13; from 150 Hz to 4kHz; col. 3, lines 20-38);

selecting a fundamental frequency (1 kHz, item 24, Fig. 2) from the defined frequency spectrum (from 150 Hz to 4kHz, col. 3, lines 20-38);

providing a harmonics generation function (transfer function 30, Fig. 3 ; col. 3, lines 42-46) to generate a number of signal harmonics based on the fundamental frequency (Figs. 14, 15a-15d; col. 5, line 62 – col. 6, line 8); and

adding the number of signal harmonics to the digital audio signal at the selected frequency (i.e., within the bandwidth; see Fig. 13; col. 5, lines 47-51).

However, Case does not explicitly specify using a user interface for selecting the fundamental frequency.

Stilson discloses a sound synthesis system (col. 2, lines 30-32) using a user interface (MIDI keyboard 122, Fig. 2) for selecting the fundamental frequency (F, col. 6, lines 42-52).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have incorporated the user interface taught by Stilson with the method of processing a digital audio signal of Case to obtain the user interface as claimed for purpose of generation of intriguing sounds, as suggested by Stilson in column 7, lines 9-10.

However, Case in view of Stilson does not explicitly specify the selected frequency being a fundamental frequency.

Machanian discloses an improved electronic piano circuit in which the second harmonic square wave of the fundamental frequency, is mixed with the fundamental frequency (see Fig. 6; col. 3, lines 52-61).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have incorporated the improved electronic piano circuit taught by Machanian with the method of processing a digital audio signal of Case in view of Stilson to obtain adding the signal harmonics to the digital audio signal at the fundamental frequency as claimed in order to enable an electronic musical instrument to sound substantially the same as an actual piano, as suggested by Machanian in column 10, lines 32-33.

Regarding **claim 2**, Stilson, as modified, further teaches wherein the step of providing a digital audio signal further comprises the steps of: providing an analog audio signal; providing an analog to digital conversion function; and converting the analog audio signal into the digital audio signal using the analog to digital conversion function (via analog to digital converter, col. 3, lines 61-63).

Regarding **claim 3,** Case in view of Stilson and further in view of Machanian teaches the method of claim 1. Stilson, as modified, further teaches wherein the step of providing and operating a user interface further comprises providing a user input mechanism (keyboard 120, Fig. 2; col. 6, lines 42-52) and a user feedback mechanism (speaker 118, Fig. 2; col. 3, lines 57-63).

Regarding **claim 4,** Case in view of Stilson and further in view of Machanian teaches the method of claim 3. Stilson, as modified, further teaches wherein the step of

providing and operating a user interface further comprises providing an auditory user feedback mechanism (speaker 118, Fig. 2; col. 3, lines 57-63).

Regarding **claim 5,** Case in view of Stilson and further in view of Machanian teaches the method of claim 3. Stilson, as modified, further teaches wherein the step of providing and operating a user interface further comprises providing a visual user feedback mechanism (computer-based music synthesis system 100, via monitor of computer user interface 104, Fig. 2; col. 3, lines 45-51).

Regarding **claim 6,** Case in view of Stilson and further in view of Machanian teaches the method of claim 3. Stilson, as modified, further teaches wherein the step of providing and operating a user interface further comprises providing both visual (computer-based music synthesis system 100, via monitor of computer user interface 104, Fig. 2; col. 3, lines 45-51) and auditory user feedback mechanisms (speaker 118, Fig. 2; col. 3, lines 57-63).

Regarding **claim 7,** Case in view of Stilson and further in view of Machanian teaches the method of claim 3. Machanian, as modified, further teaches wherein the step of providing and operating a user interface further comprises providing a mechanical user input mechanism (switch contact, key structure 24, Fig. 1; col. 4, lines 31-35).

Regarding **claim 8,** Case in view of Stilson and further in view of Machanian teaches the method of claim 3. Machanian, as modified, further teaches wherein the step of providing and operating a user interface further comprises providing an electro-mechanical user input mechanism (circuit 12, switch contact, key structure 24, Fig. 1; col. 4, lines 31-35).

Regarding **claim 9,** Case in view of Stilson and further in view of Machanian teaches the method of claim 3. Stilson, as modified, further teaches wherein the step of providing and operating a user interface further comprises providing an electronic user input mechanism (computer-based music synthesis system 100, via monitor of computer user interface 104, Fig. 2; col. 3, lines 45-51).

Regarding **claim 16**. Case in view of Stilson and further in view of Machanian teaches the method of claim 1. Machanian, as modified, further teaches wherein the step of providing a harmonics generation function further comprises providing a desired harmonics profile (second harmonic, fourth harmonic; col. 3, lines 44-60).

4. **Claims 10-15** are rejected under 35 U.S.C. 103(a) as being unpatentable over Case U.S. Patent 6,335,973 in view of Stilson U.S. Patent 5,740,716 in view of Machanian et al. U.S. Patent 3,935,783 (hereinafter, "Machanian") and further in view of Boze U.S. Patent 5,416,847.

Regarding **claim 10,** Case in view of Stilson and further in view of Machanian teaches the method of claim 3. However, Case in view of Stilson and further in view of Machanian does not explicitly discloses wherein the step of providing and operating a user interface further comprises providing a signal modification window.

Boze discloses a multi-band, digital audio noise filter in which providing and operating a user interface further comprises providing a signal modification window (first input peripheral is a rotary shaft encoder box 35, having two rotary shaft encoders 37 and 39 one encoder to set contribution-threshold of one "key" frequency bin; see col. 7, lines 26-30; the rotary shaft encoder box may be used in conjunction with the display device 45 to select a single group of eight frequency bins and the corresponding contribution-threshold, i.e., modification window, for display by the display device 45, see col. 7 lines 57-61) .

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have incorporated the multi-band, digital audio noise filter taught by Boze with the method of processing a digital audio signal of Case, Stilson, Machanian in combination such that wherein the step of providing and operating a user interface further comprises providing a signal modification window as claimed for purpose of providing a voltage signal having a variance in voltage magnitude over time which contains the harmonics that may typically be used by loud speakers to reproduce speech, music, and other auditory information, as suggested by Boze in column 5, lines 5-10.

Regarding **claim 11,** Claim 11 also met in view of above discussion of claim 10. Case, Stilson, Machanian, and Boze in combination teaches the method of claim 10 (see also Fig. 3; col. 11, lines 19-29).

Regarding **claim 12,** Boze, as modified, teaches further comprising the step of providing a memory function (EPROM; col. 11, line 59 – col. 12, line 3).

Regarding **claim 13,** Boze, as modified, teaches further comprising the step of storing, within the memory function, information on the modification window's relative position (information needs to scan the voltage outputs; EPROM; col. 11, line 59 – col. 12, line 3).

Regarding **claim 14,** Boze, as modified, teaches further comprising the step of storing, within the memory function, information correlating the information on the modification window's relative position to a particular type of digital audio signal (speech, music; col. 5, lines 1-10).

Regarding **claim 15,** Boze as modified, further teaches wherein the step of providing and operating a user interface further comprises providing a plurality of signal modification windows, and wherein information on each modification window's relative position is stored within the memory function (for eight faders, information needs to scan the voltage outputs; EPROM; col. 11, line 54 – col. 12, line 3).

5. **Claims 17-22, and 41** are rejected under 35 U.S.C. 103(a) as being unpatentable over Case U.S. Patent 6,335,973 in view of Stilson U.S. Patent 5,740,716 in view of Machanian et al. U.S. Patent 3,935,783 (hereinafter, "Machanian") and further in view of and further in view of Smith et al. U.S. Patent 7,003,120 (hereinafter, "Smith").

Regarding **claim 17,** Case in view of Stilson and further in view of Machanian teaches the method of claim 1. However, Case in view of Stilson and further in view of Machanian does not explicitly discloses wherein the step of providing a harmonics generation function further comprises providing an algorithm that generates signal harmonics, according to the desired harmonics profile, of the digital audio signal at the fundamental frequency.

Smith discloses a methods for dynamically altering the harmonic content of audio signals for the purpose of changing their sound or perception of their sound in which a filter may also be in the form of an equalizer, mathematical model, or algorithm. The filters are calculated based on the harmonic's location in frequency, amplitude, and time with respect either to any other harmonic (col. 10, lines 25-29); harmonic profile (see Figs. 1, 2, 3; col. 11, lines 26-45).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have incorporated the methods for dynamically altering the harmonic content of audio signals taught by Smith with the method of processing a digital audio signal of Case, Stilson, Machanian in combination such to obtain the

algorithm as claimed for purpose of changing sound or perception of sound, as suggested by Smith in column 1, lines 16-18.

Regarding **claim 18,** Case, Stilson, Machanian in combination teaches the method of claim 16. Smith, as modified, further teaches wherein the step of providing a harmonics generation function further comprises providing a desired harmonics profile, wherein the harmonics profile comprises harmonics that decrease in relative weight as relative order increases (see Figs. 1, 2, 3; adjusted downward in energy content and amplitude, col. 11, lines 46-56).

Regarding **claim 19,** Case, Stilson, Machanian, and Smith in combination teaches the method of claim 18. Machanian, as modified, further teaches wherein the step of providing a desired harmonics profile further comprises providing only even order harmonics col. 3, lines 48-62.

Regarding **claim 20,** Case, Stilson, Machanian, and Smith in combination teaches the method of claim 19. Case, Stilson, Machanian, and Smith in combination, as modified, further teaches wherein the wherein the harmonics profile comprises only second, fourth (see Machanian, col. 3, lines 48-62), and sixth harmonics (see Smith col. 11, lines 46-53).

Regarding **claim 21,** Case, Stilson, Machanian, and Smith in combination teaches the method of claim 18. Case, Stilson, Machanian, and Smith in combination, as modified, further teaches wherein the step of providing a desired harmonics profile further comprises step of providing a user, via the user interface (see Stilson, keyboard 120, Fig. 2; col. 6, lines 42-52), the ability to selectively alter which harmonics are included in the harmonics profile (see Smith, Figs. 1, 2, 3; adjusted downward in energy content and amplitude, col. 11, lines 46-53; see Machanian, second harmonic, fourth harmonic; col. 3, lines 44-60).

Regarding **claim 22,** Case, Stilson, Machanian, and Smith in combination teaches the method of claim 18. Case, Stilson, Machanian, and Smith in combination, as modified, further teaches wherein the step of providing a desired harmonics profile further comprises step of providing a user, via the user interface, the ability to selectively alter the relative weight of each harmonic included in the harmonics profile (see Smith, Figs. 1, 2, 3; adjusted downward in energy content and amplitude, col. 11, lines 46-53; see also Fig. 6, col. 9, lines 58-61).

Regarding **claim 36**, Case teaches a system for providing user-modified processing of a digital audio signal (see Figs. 1, 2, 12, 13; digital application, col. 3, lines 20-33), the system comprising:

a digital input audio signal having a defined signal spectrum (amplitude vs frequency plots, see Figs. 1, 2, 13; from 150 Hz to 4kHz; col. 3, lines 20-38);

a harmonics profile, specify generation of a second harmonic, a fourth, and a sixth harmonic of the digital input audio signal (see Fig. 15b. col. 5, line 62 –col. 13, line 4);

a harmonics generation function (transfer function 30, Fig. 3 ; col. 3, lines 42-46) to generate a number of signal harmonics based on the fundamental frequency (Figs. 14, 15a-15d; col. 5, line 62 – col. 6, line 8);

a summing function (207, Fig. 16), add the harmonics generated by the harmonics generation function to the digital input audio signal to generate a modified output audio signal (col. 7, lines 17-25);

a user feedback mechanism communicate the modified output audio signal to a user (speaker of hearing aid , Fig. 20, col. 7, lines 30-36).

However, Case does not explicitly specify using a user interface for selecting the fundamental frequency throughout the signal spectrum of the digital input audio signal.

Stilson discloses a sound synthesis system (col. 2, lines 30-32) using a user interface (MIDI keyboard 122, Fig. 2) for selecting the fundamental frequency throughout the signal spectrum of the digital input audio signal (Frequency range of MIDI, col. 6, lines 42-52).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have incorporated the user interface taught by Stilson with the method of processing a digital audio signal of Case to obtain the user interface as

claimed for purpose of generation of intriguing sounds, as suggested by Stilson in column 7, lines 9-10.

However, Case in view of Stilson does not explicitly specify the selected frequency being a fundamental frequency.

Machanian discloses an improved electronic piano circuit in which the second harmonic square wave of the fundamental frequency, is mixed with the fundamental frequency (see Fig. 6; col. 3, lines 52-61).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have incorporated the improved electronic piano circuit taught by Machanian with the method of processing a digital audio signal of Case in view of Stilson to obtain adding the signal harmonics to the digital audio signal at the fundamental frequency as claimed in order to enable an electronic musical instrument to sound substantially the same as an actual piano, as suggested by Machanian in column 10, lines 32-33.

However, Case in view of Stilson and further in view of Machanian does not explicitly discloses a second harmonic of weight equal to 75% of the digital input audio signal, a fourth harmonic of weight equal to 50% of the digital input audio signal, and a sixth harmonic of weight equal to 25% of the digital input audio signal.

Smith discloses a methods for dynamically altering the harmonic content of audio signals for the purpose of changing their sound or perception of their sound in which a filter may also be in the form of an equalizer, mathematical model, or algorithm. The filters are calculated based on the harmonic's location in frequency, amplitude, and time

with respect either to any other harmonic (col. 10, lines 25-29); harmonic profile (see Figs. 1, 2, 3; col. 11, lines 26-45); the sixth and eighth harmonics are adjusted downward. Smith further discloses harmonics may be either increased or decreased in amplitude by various methods referred herein as amplitude modifying functions.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have incorporated the methods for dynamically altering the harmonic content of audio signals taught by Smith with the method of processing a digital audio signal of Case, Stilson, Machanian in combination such to obtain the a second harmonic of weight equal to 75% of the digital input audio signal, a fourth harmonic of weight equal to 50% of the digital input audio signal, and a sixth harmonic of weight equal to 25% of the digital input audio signal as claimed for purpose of changing sound or perception of sound, as suggested by Smith in column 1, lines 16-18.

6. **Claims 23-26, and 35** are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al. U.S. Patent 7,003,120 (hereinafter, "Smith") in view of Machanian et al. U.S. Patent 3,935,783 (hereinafter, "Machanian").

Regarding **claim 23**, Smith teaches a device for processing digital signals (see Figs. 1, 2, 3, 4, 6, 10, and respective portions of the specification) comprising:

a signal acquisition function output a digital input signal (A/D 26, Fig. 10);

a user interface function (selecting frequency-finding, col. 22, lines 31-37), communicatively coupled to a user interface (col. 22, lines 61-67), receive the digital input digital audio signal and to provide a user-selected fundamental frequency (user-defined; col. 22, lines 31-37);

a comparator function (i.e., compare one sound or signal to another), receive the digital input digital audio signal and the user-selected fundamental frequency, and to output a portion of the digital input signal at the user-selected fundamental frequency (col. 15, lines 3-14);

a harmonics generation function (i.e., harmonic synthesis), receive from the comparator function the portion of the digital input signal at the user-selected fundamental frequency, and to generate a number of signal harmonics for the portion of the digital input signal at the user-selected fundamental frequency based on a defined harmonics profile (col. 13, lines 43-48); and

a summing function (mixer 18, Fig. 4), receive the signal harmonics from the harmonics generation function and to add the signal harmonics to the digital input signal (see Fig. 3; col. 11, lines 45-56; col. 22, lines 50-53)

However, Smith does not explicitly disclose to add the signal harmonics to the digital input at the user-selected fundamental frequency.

Machanian discloses an improved electronic piano circuit in which the second harmonic square wave of the fundamental frequency, is mixed with the fundamental frequency (see Fig. 6; col. 3, lines 52-61).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have incorporated the improved electronic piano circuit taught by Machanian with the device for processing digital signals of Smith such that to add the signal harmonics to the digital audio signal at the fundamental frequency as claimed in order to enable an electronic musical instrument to sound substantially the same as an actual piano, as suggested by Machanian in column 10, lines 32-33.

Regarding **claim 24**, Smith in view of Machanian teaches the device of claim 23. Smith, as modified, further teaches wherein each of the functions is implemented in a separate device (see above discussion of Claim 1, also see Smith, Fig. 10).

Regarding **claim 25**, Smith in view of Machanian teaches the device of claim 23. Smith in view of Machanian does not explicitly disclose wherein two or more of the functions are integrated within a single device.

However, it is known in the art to provide several parts secured together as a single unit two or more functions within a single device. See In re Larson, 144 USPQ 347 (CCPA 1952).

In this regard, to integrate two or more of the functions are integrated within a single device for purpose of saving processing time would have been considered obvious for one of ordinary skill in the art.

Regarding **claim 26**, Smith in view of Machanian teaches the device of claim 23. Smith, as modified, further teaches wherein the signal acquisition function comprises an analog to digital conversion function (A/D 26, Fig. 10).

Regarding **claim 35**, Smith in view of Machanian teaches the device of claim 23. Smith, as modified, further teaches wherein the user interface and harmonics generation functions are further generate and process, respectively, a user-adapted harmonics profile (col. 13, lines 43-48; col. 22, lines 61-67).

7. **Claims 27-34** are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al. U.S. Patent 7,003,120 (hereinafter, "Smith") in view of Machanian et al. U.S. Patent 3,935,783 (hereinafter, "Machanian") and further in view of Boze U.S. Patent 5,416,847.

Regarding **claim 27**, Smith in view of Machanian teaches the device of claim 23. However, Smith in view of Machanian does not explicitly disclose wherein the user interface function and the user interface are cooperatively provide a signal modification window, by which an end-user selects a fundamental frequency.

Boze discloses a multi-band, digital audio noise filter in which providing and operating a user interface further comprises providing a signal modification window (first input peripheral is a rotary shaft encoder box 35, having two rotary shaft encoders 37 and 39 one encoder to set contribution-threshold of one "key" frequency bin; see col. 7,

lines 26-30; the rotary shaft encoder box may be used in conjunction with the display device 45 to select a single group of eight frequency bins and the corresponding contribution-threshold, i.e., modification window, for display by the display device 45, see col. 7 lines 57-61) .

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have incorporated the multi-band, digital audio noise filter taught by Boze with the method of processing a digital audio signal of Smith in view of Machanian such that wherein the user interface function and the user interface are cooperatively provide a signal modification window, by which an end-user selects a fundamental frequency as claimed for purpose of providing a voltage signal having a variance in voltage magnitude over time which contains the harmonics that may typically be used by loud speakers to reproduce speech, music, and other auditory information, as suggested by Boze in column 5, lines 5-10.

Regarding **claim 28**, Smith in view of Machanian and further in view of Boze teaches the device of claim 27. Machanian, as modified, further teaches wherein the user interface comprises a user input mechanism (switch contact, key structure 24, Fig. 1; col. 4, lines 31-35) and a user feedback mechanism (speaker 66, Fig. 1).

Regarding **claim 29**, Smith in view of Machanian and further in view of Boze teaches the device of claim 28. Machanian, as modified, further teaches wherein the

user feedback mechanism comprises an auditory user feedback mechanism (speaker 66, Fig. 1).

Regarding **claim 30,** Smith in view of Machanian and further in view of Boze teaches the device of claim 28. Smith, as modified, further teaches wherein the user feedback mechanism comprises a visual user feedback mechanism (spectral display, col. 7, lines 30-35)

Regarding **claim 31,** Smith in view of Machanian and further in view of Boze teaches the device of claim 28. Smith in view of Machanian and further in view of Boze, as modified, further teaches wherein the user feedback mechanism comprises both visual (see Smith, spectral display, col. 7, lines 30-35) and auditory user feedback mechanisms (Machanian, speaker 66, Fig. 1).

Regarding **claim 32,** Smith in view of Machanian and further in view of Boze teaches the device of claim 28. Machanian, as modified, further teaches wherein the user interface further comprises a mechanical user input mechanism (switch contact, key structure 24, Fig. 1; col. 4, lines 31-35).

Regarding **claim 33,** Smith in view of Machanian and further in view of Boze teaches the device of claim 28. Machanian, as modified, further teaches wherein the

user interface further comprises an electro-mechanical user input mechanism (see Machanian, circuit 12, switch contact, key structure 24, Fig. 1; col. 4, lines 31-35). .

Regarding **claim 34,** Smith in view of Machanian and further in view of Boze teaches the device of claim 28. Smith, as modified, further teaches wherein the user interface further comprises an electronic user input mechanism (i.e., software is used to carry out the desired calculations and manipulations, see Smith col. 9, lines 31-33).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Con P. Tran whose telephone number is (571) 272-7532. The examiner can normally be reached on M - F (8:30 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Vivian C. Chin can be reached on (571) 272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

cpt CPJ
February 4, 2008

VIVIAN CHIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600